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# *Field Brome Cover Crop*

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

PLANT MATERIALS CENTER  
ELSBERRY, MISSOURI



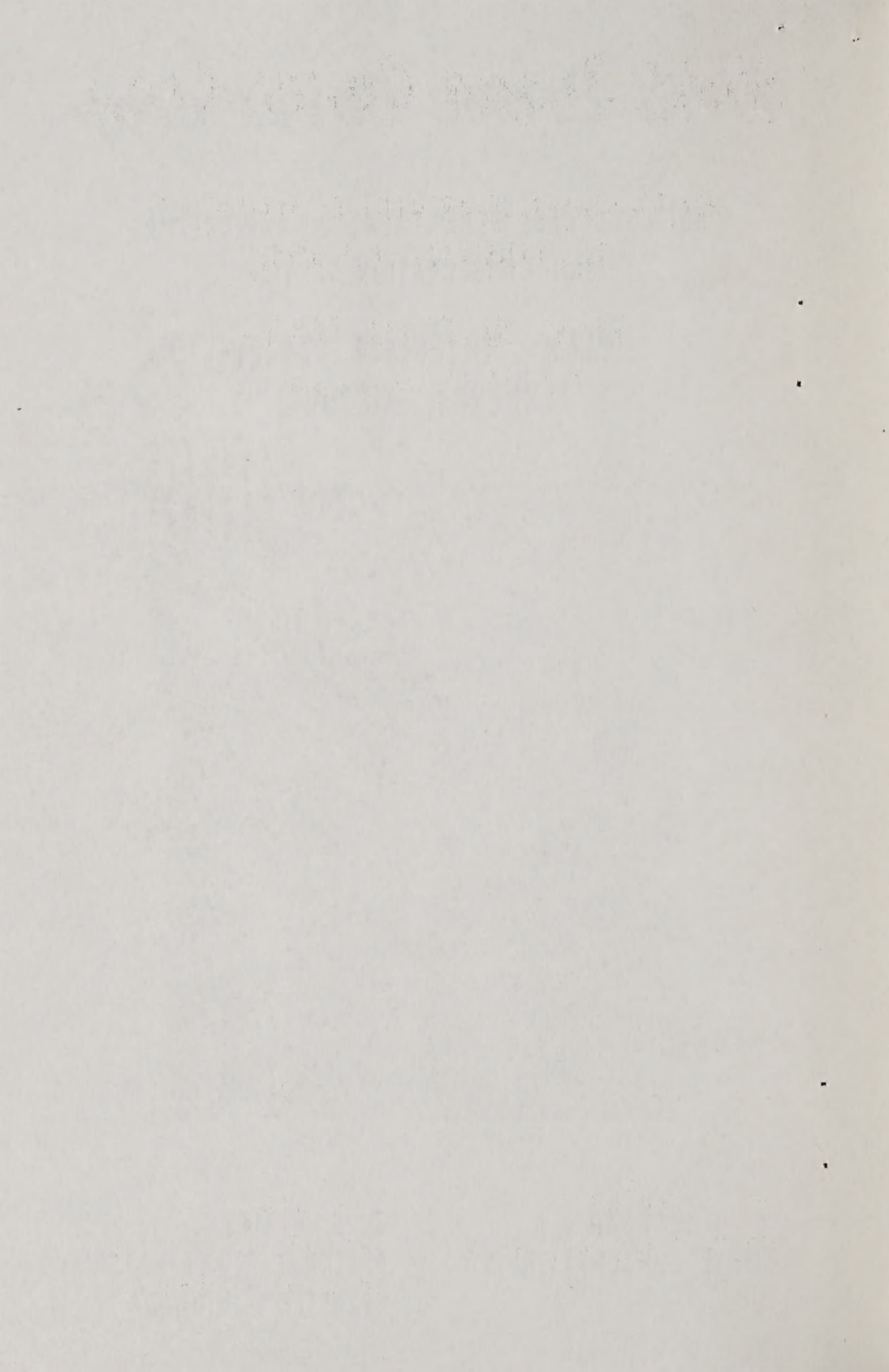
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# FIELD BROME COVER CROP

## 1955 - 1963

By

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Field brome (Bromus arvensis) is a cool season annual brome grass. It develops a fibrous root system that becomes a mass of fine roots in the top 18" of soil. Field brome was first tested at the Elsberry Plant Materials Center in 1941 as a forage grass, but it was discarded and interest was not renewed until 1955. A seed increase field was planted in 1955 and seed has been produced each year since 1955 with the exception of one year. It is winter hardy at Elsberry and the interest in it is primarily for use as a winter cover crop.

Variety - The variety tested and described here is Svalof Sleipner's pronounced "swallow". It originated in Sweden.

Date of seeding - The production fields have been seeded at the normal fall seeding date varying from August 15 to September 15 and good stands have been obtained.

In 1955 plot seedings were made September 30 (two weeks before frost), October 17 (killing frost), and November 1 (two weeks after killing frost). The purpose was to determine the optimum date of seeding, and amount of cultivation necessary to completely remove the cover crop in the spring. It was seeded at the rate of ten pounds per acre and fertilized with 300 pounds per acre of 12-12-12. The September 30 seeding made fall emergence and some winter cover but extended fall drouth caused the October 17 and November 1 seedings to fail. The two later seedings made no fall emergence nor winter cover.

Plowing once before seedheads emerged effected a complete control.

Plots consisting of 4 rows 16 feet long and 9 inches apart were seeded each week starting June 30, 1958, then seeded monthly during the winter months and terminated April 6, 1959 as illustrated in Figure 1. Each seeding was irrigated to insure emergence. The seedlings made from June 30 to August 25 had fair vigor while those August 25 through September 29 were outstanding in vigor and had the best seed set. Plants in the seedlings made October 1 to November 16 were spindly and did not stool. They did form a few seedheads. All spring seedings died in hot weather during July and August.



*Figure 1. This illustrates the method used for date of seeding trials. The late summer and early fall seedings are shown in the foreground, and furnished good winter cover. W. H. Billings is observing a planting made December 17.*



Plot plantings were repeated on September 10, 1959, November 16, November 23, December 21, January 13, 1960, April 11, May 9, June 6 and July 5, 1960. The September planting had good vigor and the best seed yield. The November and December plantings were much less vigorous and all plantings after that date died in the hot summer weather before maturity.

Based on these tests, the optimum seeding date at Elsberry for field brome is between August 10 and October 5.

Rate of seeding - Seeding at the rate of 10 to 15 pounds per acre has consistently given a good stand. A heavier rate of seeding results in a winter cover becoming established sooner, but there is less stooling and seed yields are not increased.

Seed treatment - When the planting is for seed production, the seed should be treated with a food fungicide at planting time to control smut. Use 1/4 to 1/2 oz. of Ceresan M or its equivalent per bushel. The weight per bushel will vary from 20 to 26 lbs. depending on how seed is processed.

Method of seeding - To establish the seed production field the Culti-packer seeder was used on a well prepared seedbed. The fertilizer side of a grain drill, an Easy-Flo fertilizer spreader and a Culti-Packer seeder were used to plant undeawned seed at Elsberry in 1963.

Trials at Elsberry in 1963 with undeawned seed demonstrated that in most instances farmers can plant undeawned seed. Fertilizer or lime spreaders can be used to broadcast the seed. Stands have been established using a wide variety of methods and seedbed conditions. It should not be planted deeper than one-half inch.

Growth habit - With proper soil moisture conditions, field brome consistently emerged in 7 to 10 days. Germination was immediate and nearly complete in this length of time. There is adequate growth above ground for winter protection when seeded by September 10 at Elsberry. Growth starts vary early and by late spring a very heavy root system has developed. The height of the plant seldom exceeds 16 inches.

Seedheads bloom during the latter part of May or early June, and the seed is ripe by approximately July 14. Field brome is apt to lodge badly and shatter a lot of seed but it still will make a good yield. The average date of harvest at Elsberry has been July 14 and the average yield for five years has been 864 pounds of clean seed per acre. The highest yield was 1313 pounds of seed per acre in 1958. The lowest yield was 242 pounds per acre in 1960 after a severe infestation of smut. The average purity is 98 percent and the average germination is 92 percent.

Harvesting - Has been by combining direct when seed is fully ripe. This normally occurs two weeks after a purplish cast appears over the field. The normal date of harvest for Elsberry is July 14. (Details in last section of this report.)

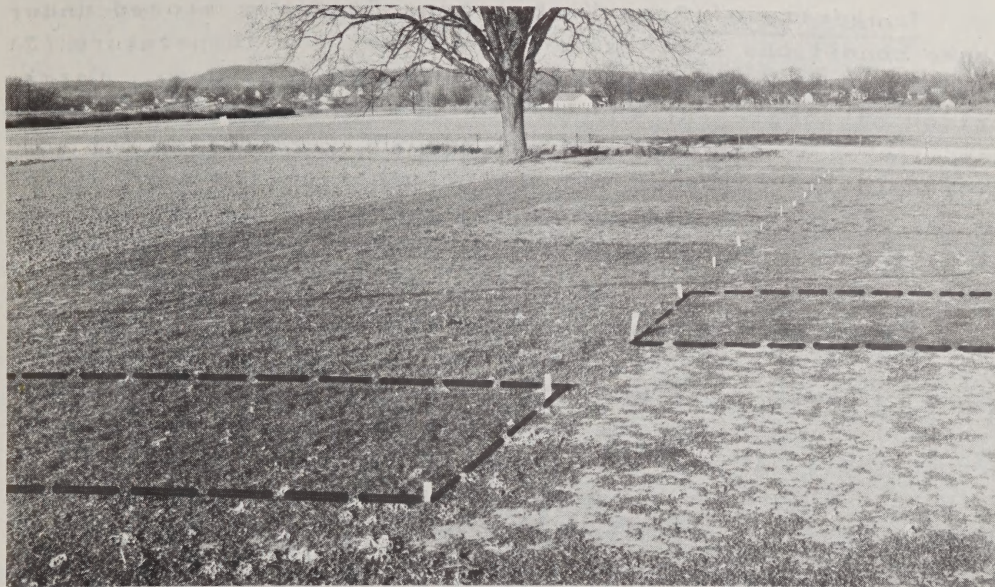
Cover crop - Three replications of plots 10 x 12 were seeded September 15, 1959 on a prepared seedbed using field brome, mountain brome, rye, perennial ryegrass, Italian ryegrass, rescuegrass, California brome, smoothbrome and tall fescue. Field brome and rye were rated good for winter cover. The ryegrasses were fair and all others were rated poor. Measurements taken June 16 showed a root yield of 5755 pounds of field brome roots per acre and 4318 pounds of roots for rye. Root samples were taken to a six inch depth. All others had only half that amount or less. Field brome did not develop excellent ground cover until April 25.

Three replications of plots that included crimson clover, hairy vetch and meadow brome were planted in 1958; crimson clover and ryegrasses winterkilled and some winterkill was evident in meadow brome and mountain brome. The rye, ryegrass and field brome established a good winter cover.

Figure 2 shows the plot layout and Figure 3 shows changed soil tilth of field brome plots after plowing.

Weedy characteristics - There is little or no dormancy in field brome seed and germination is rapid. A plot was allowed to drop all its seed after maturity. After it germinated and a stand developed the plot was plowed. A plant count, the following spring, showed two plants per square foot. The fear expressed by some that field brome will be a weed problem seems to have no validity.





*Figure 2. Two replications of winter cover plots are shown here with the field brome plots outlined.*



*Figure 3. Soil tilth is difficult to measure but this illustration shows the effect of field brome seeded September 23, 1958 and plowed spring 1959. The field brome plots had excellent tilth as shown in this photo. The fibrous annual roots made seedbed preparation easy for the succeeding crop.*

Longevity of Seed Viability - Seed was stored under three conditions which were (1) office room temperature (2) coldroom - 32-40 degrees F and (3) in soil 6" deep. Germination of samples at the end of six months showed all the seed stored in the soil had rotted, 80% germination for seed stored in the coldroom and 96% germination for seed stored in the office. At the end of two years seed in the coldroom germinated 30% and seed stored in a desk germinated 44 percent.

Plots were seeded at the rate of approximately 250 pounds of seed per acre at depth of 2" and 6". An excellent stand naturally resulted. No seedheads were allowed to mature and one-third of the area plowed the first year and the second year. At the end of the second year, there were no volunteer plants in the plots. Other weeds had invaded the plots.

Cover crops in Corn - Four grasses were seeded with five replications at the last cultivation of corn in 1958, 1959 and 1960 but a stand failure resulted. A seeding in 1960 was designed to determine the cause of stand failure. Plantings were made June 21 and July 12 using a one row hand operated drill, and July 13 with a grain drill. Seedling stand counts revealed an average of twelve plants per linear row foot. Fall and winter survival was a very small percent and essentially negligible.

The 1960 planting was made in both 40" and 80" rows using alfalfa, rye, ryegrass, and field brome. Alfalfa failed in both instances. Stand count March 12, 1961 showed rye made a 20% stand in both 40" x 80" rows. Ryegrass had a 35% stand in 40" rows and 10% stand in 80" rows, and field brome had a 26% stand and 10% stand respectively. This work is being continued.

Potential - Soils have not been found to be a limiting factor in growing field brome. Cooperators farming Mississippi River bottomland, that is heavy and has poor drainage, causing a wetness problem report they can prepare a seedbed and plant corn earlier on land that has grown a crop of field brome. They further report that tractors can be operated one gear higher on these fields making planting of corn faster and at less cost.



The results indicate field brome has a place following any crop harvested in late summer, on orchards and commercial nurseries, and in conjunction with crops not too severely competitive for light and moisture. It has been reported as good goose browse in Michigan and Missouri.

Field brome is used extensively in seeding trials with smoothbrome on backslope terraces and waterways in Iowa and Illinois. It provides a quail cover and protection until smooth brome takes over.

Planting corn into field brome sod - Small plots of corn have been planted into field brome sod without any seedbed preparation for three years beginning in 1961. Fertilizer was applied at planting time in 1962 and 1963. Corn yields in 1962 ranged from 28 bushels per acre to 81 bushels per acre and averaged ( ) bushels per acre. Yields in 1963 averaged 54 bushels per acre and showed drouth damage. There was no cultivation from planting to harvest on any of the plots. The technique of planting corn in sod has not been satisfactorily worked out. Adequate stands have not been obtained. Work on this aspect has been discontinued at the Plant Materials Center. The 1963 trial is shown in Figure 4.



*Figure 4. Corn was planted into field brome sod without killing the grass with chemicals. This was a no tillage method and corn was not cultivated.*



Field plantings - Since 1957 over 100 field plantings of field brome have been made on district cooperator's farms in Missouri, Kentucky and Illinois from seed furnished by the Plant Materials Center, Elsberry, Mo. Sixty-five percent of these plantings have rated good to excellent. Seedlings made between August 15 and September 30 have been consistently successful. Earlier or later plantings have not been good. It does not make as upright growth as ryegrass and wheat but furnishes a dense compact cover that is easy to destroy for a succeeding crop. It seems to do a better job of conditioning the surface six inches of soil. There are indications that corn and field brome can be grown on the same land without turning the land or reseeding field brome. This would definitely add to the conservation value of the field brome as a cover crop. Figures 5 and 6 show typical growth of field brome and wheat planted in the fall of 1961 on adjacent fields with identical soils at Elsberry.

Harvesting and Processing Seed - Field brome has weak straw and has a strong tendency to lodge. It is susceptible to stem rust and black smut at Elsberry. Smut can seriously reduce seed yields when it is prevalent and may cause a loss of most of the crop. Field inspection near the time for harvest will reveal the presence of smut. Usually it goes undetected until seeds are formed or, are essentially replaced by smut.

Field brome can be combined direct and usually there is no need for a pickup attachment. The air should be cut off. A  $3/4 \times 3/16$  screen can be used and the top adjustable sieve set  $3/4$  open and the bottom  $1/2$  open. There is a tendency for seed to ride through the combine on the bulk of straw. Cylinder clearance should be  $1/4$  to  $1/2$  inch, cylinder speed about 900 rpm, and the operator may need to take only a partial swath to get good separation. Attempting to harvest a full swath can cause a lot of seed to be lost. The seed has a long awn and has been deawned in a hammer mill before cleaning. This is accomplished by using a hammer mill with swinging blades at 900 rpm's while keeping the mill full of seed. Clean seed has about 330,000 seeds per pound.



*Figure 5. Field brome as a cover crop.*



*Figure 6. Wheat as a cover crop.*

Processing - The seed has an awn which may make it difficult to seed. Growers that do not specialize in grass seed production and processing should seriously consider having the seed processed commercially. Deawning is a specialized job and seed processed commercially is normally deawned cleanly without damage to the seed. The seed must be dry and brittle for deawning. If moisture content is too high, the awns do not break off smooth and clean but must be roughly torn off.

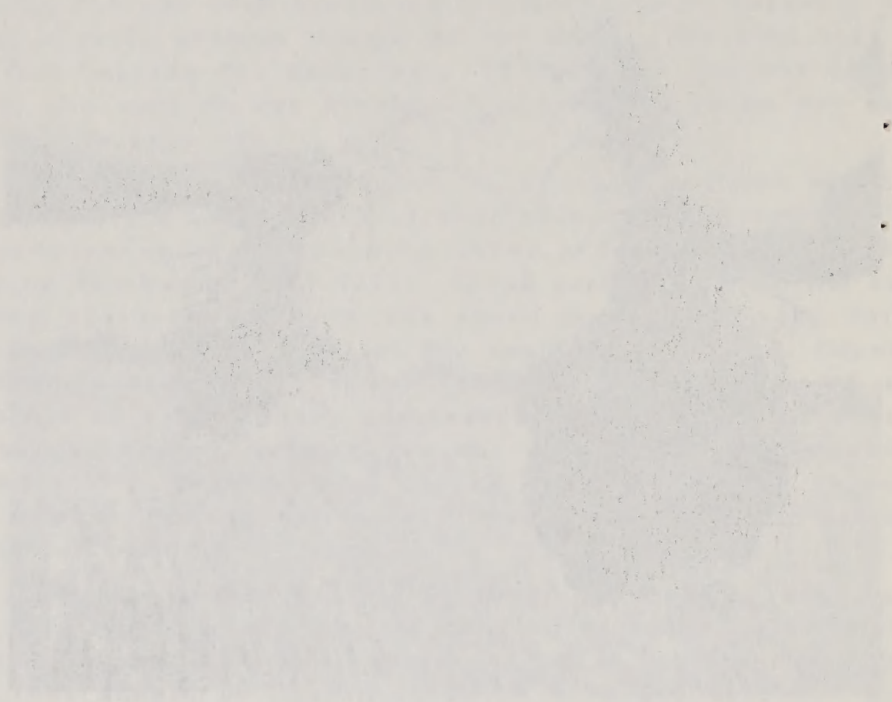
The seed can be deawned by growers without special equipment if a hammer mill is available. It is accomplished by processing it in the mill using a 1/4 inch screen and keeping the hammer mill full. Close examination of the seed at the start may dictate the speed and screen size for a particular mill. A speed of 900 rpm's is suggested. Usually seed processed in this manner, will not have the smooth appearance of commercially processed seed, but viability will be maintained if the seed is not processed at excessive speeds. The deawned seed can be readily planted through any type of seeding equipment. Clean seed has about 330,000 seeds per pound.

Seed can be successfully deawned by running it through the combine using a 1/2 x 3/8 slotted screen at 1300 rpm's. Cylinder spacing is approximately 3/16". The combine pitman and reel should be disconnected as a safety factor. Seed should be dried before re-running so the awns will break off easily. Seed is shoveled from bin, floor or dryer to the elevator canvas on the combine so that the seed passes completely through the combine. Adjustable sieves should be 1/2 open and the seed fed at a rate that it will not spill over the return auger. This has been satisfactorily accomplished at the Plant Materials Center with an AC Model 72 All-Crop harvester. Any combine should do the job.





MO-L-37-1. This picture was taken May 5, 1962 of field brome and wheat grown on adjacent fields on the same soil type at Elsberry, Missouri. The samples were taken from a field planting on the F. H. Hagemeier Farm, and graphically demonstrates the difference in root development and soil binding characteristics as well as, differences in amount of top growth. Field brome on the left has a much denser root system and more soil binding effect.



The first of these is the fact that the  
 world is not a uniform whole, but is  
 divided into many different parts, each  
 with its own characteristics and laws.  
 The second is that the world is not  
 a static entity, but is constantly  
 changing and evolving. The third is  
 that the world is not a simple  
 machine, but is a complex system  
 of many interacting parts. The fourth  
 is that the world is not a single  
 entity, but is a collection of many  
 different entities, each with its own  
 life and history. The fifth is that the  
 world is not a single entity, but is  
 a collection of many different entities,

